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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/564,584	BIESTER, KLAUS	
	Examiner	Art Unit	
	Philip Stimpert	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-13,15,16,33,35-39 and 42-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-13,15,16,33,35-39 and 42-47 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 10, 11, 13, 15, 16 and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. (US 2002/0108747) in view of Yie (US 4,862,911).

3. Regarding claim 1, Dietz et al. teach a pump device for the hydraulic actuation of a valve (see Fig. 5) used in the production of hydrocarbons (such as crude oil or natural gas). In particular, Dietz et al. teach a safety valve (60, see Fig. 2), and a pump (102, see paragraph 25). Dietz et al. teach that the pump can pump hydraulic fluid in the direction of the valve (to actuate the mechanical linkage 95), and that the pump may be an electric pump (thus comprising an electric drive device). Dietz et al. do not teach the details of the pump (102), and thus do not teach a piston-cylinder unit. Yie teach a high pressure pump and a valving arrangement therefor. In particular, Yie teach a piston (45) within a cylinder (40), first (31) and second (22) ports of the cylinder. Yie teach that the piston reciprocates, traveling to a first position (as shown in Fig. 1) forcing fluid from the cylinder out the first port (31) and then traveling to a second position (as shown in Fig. 2) drawing fluid through the second port (22) into the cylinder (40). Various piston positions are also taught in Fig. 7. Yie also teaches a drive mechanism (65) for providing the reciprocation, which may be electrical (col. 7, ln. 13-14). As Dietz

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et al. plainly contemplate that a conventional pump may be used to provide the hydraulic fluid to their safety valve, it would be obvious to one of ordinary skill in the art to use a pump such as that taught by Yie in order to supply that pump. Thus provided, the pump of Yie would pump the hydraulic fluid of Dietz et al., and the first port (31) of Yie would direct the hydraulic fluid toward the valve under pressure.

4. Regarding claim 10, Yie teaches the piston (45) is adjustably supported (for reciprocation) in a piston chamber (41) of the cylinder, and that the first (31) and second (22) ports are disposed on the face side of the piston chamber (41), and include (constitute) suction (22) and discharge (31) holes, the suction hole (22) opening into an intermediate reservoir (21).

5. Regarding claim 11, Yie teaches that each hole has a non-return valve (24, 32) extending through a valve member (20, 36) into a cylinder bottom plate (14), the non-return valves being subjected to a (spring) force opposite to the hydraulic fluid flow direction through the respective hole.

6. Regarding claim 13, Yie teaches that the suction hole (22) opens into the intermediate reservoir (21) with its end facing away from the piston.

7. Regarding claim 15, Yie teaches that the discharge hole (31) is connected to a discharge pipe (15). In the instant combination, the discharge pipe (15) is used to pass hydraulic fluid in the direction of the valve of Dietz et al.

8. Regarding claim 16, Yie teaches that the discharge pipe (31) is brought out through a volume in direct communication with the intermediate fluid reservoir (21), as shown in Fig. 1.

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9. Regarding claim 33, the pump of Yie consists of several modules (for instance 60, 65, 14) and is thus considered to be of modular construction.

10. Regarding claim 35, Dietz et al. teach a quick-release coupling (47) between a housing of the pump and a hydraulic fluid supply pipe (39).

11. Regarding claim 37, Dietz et al. teach that the hydraulic fluid is an injection fluid, in that it is injected into the hydraulic valve system by the pump.

12. Regarding claim 42, Dietz et al. teach that the injection fluid is an inhibitor, at least in that it is used to inhibit the closing of the safety valve.

13. Regarding claim 44, Dietz et al. teach an apparatus for a subsea tree used in the production of hydrocarbons, a pump (102) to pump hydraulic fluid into a conduit (77) for hydraulic actuation of a subsea tree valve (60), an electrical drive device (see paragraph 25) movably connected to the pump (102) to drive the pump, and an electrical cable (80) connecting the power source to the electrical drive device.

According to the combination with Yie, Yie teaches a piston cylinder unit having a piston (45) within a cylinder (40) and an electric drive (65) to drive the piston (45) and thereby pressurize hydraulic fluid in the cylinder (40) and force it toward the valve.

14. Regarding claim 45, Dietz et al. teach a hydraulic source (see Fig. 24) located subsea and communicating with the pump, in particular the cylinder (40) of Yie for the hydraulic fluid pumping. The examiner notes that “a hydraulic source” is a broad limitation, and reads on any holding area of the incompressible fluid of Dietz et al.

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15. Regarding claim 46, Dietz et al. teach that the pump and electrical drive device are adapted for releasable connection to the body of the subsea tree via threaded joints (47, see paragraph 14).

16. Claims 12 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. in view of Yie and Rodgers (US 4,222,725).

17. Regarding claim 43, Dietz et al. teach a pump device (102) for the hydraulic actuation of a safety valve (60) on a pipeline used in the production of hydrocarbons. According to the combination with Yie, the pump device comprises a body (40) with a cylinder (41) housing a piston (45) such that hydraulic fluid can be pumped under pressure in the cylinder in the direction of the safety valve, and an electrical drive device (65) movably connected to the piston of the piston-cylinder unit to move the piston in a longitudinal direction inside the cylinder (41). Neither Dietz et al. nor Yie teach any particular pressure monitoring. Rodgers teaches an injection pump, and a system for monitoring the pressure therein. Rodgers particularly teaches a pressure sensor (56) for sensing hydraulic fluid pressure, a pressure switch (34) receiving signals from the sensor, and that the pressure switch activates a relief valve (24) upon the pressure in the cylinder reaching a predetermined value (see Fig. 3). Rodgers teaches that this system provides response to errors in the pumping process. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to adapt the pressure sensing system of Rodgers et al. to the pump of Yie as applied to the apparatus of Dietz et al. in order to provide error response to that system.

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18. Regarding claim 12, Yie teaches that the holes are formed in a cylinder bottom plate (14) releasably fixed on the cylinder (4). As taught by Rodgers, the pressure sensor (56) is connected to the cylinder. As such, any branch (i.e. 11 or 15) of Yie will be at least indirectly connected to the pressure switch taught by Rodgers.

19. Claims 2-5 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. in view of Yie and Giese (US 1,852,560).

20. As an initial matter, please note that the current patent to Giese being referenced is separate from that referenced in the previous office action.

21. Regarding claim 2, Yie teaches providing linear movement of the piston either by a drive shaft and cam system (Fig. 7) or by fluid pressure (Fig. 8). However, neither Dietz et al. nor Yie teach a spindle drive and gear system. Giese teaches an electrical drive which includes a spindle drive (28, 29), a reduction gear (36), a spur gear (35) and a drive shaft (see Figs. 1 and 2) rotated by an electric motor (32). This spindle drive is taught for the purpose of providing linear movement of a piston. One of ordinary skill would recognize that a spindle drive as taught by Giese could be applied to the piston of Yie in the apparatus of Dietz et al. using known methods of construction of mechanical devices, and that it would produce the predictable result of linear motion of the piston. Where a claimed improvement on a device or apparatus is no more than "the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for improvement," the claim is unpatentable under 35 U.S.C. 103(a). Ex Parte Smith, 83 USPQ.2d 1509, 1518-19 (BPAI, 2007) (citing

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KSR v. Teleflex, 127 S.Ct. 1727, 1740, 82 USPQ2d 1385, 1396 (2007)). Accordingly, Applicant claims a combination that only unites old elements with no change in the respective functions of those old elements, and the combination of those elements yields predictable results; absent evidence that the modifications necessary to effect the combination of elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a). Ex Parte Smith, 83 USPQ.2d at 1518-19 (BPAI, 2007) (citing KSR, 127 S.Ct. at 1740, 82 USPQ2d at 1396. Accordingly, since the applicant[s] have submitted no persuasive evidence that the combination of the above elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a) because it is no more than the predictable use of prior art elements according to their established functions resulting in the simple substitution of one known element for another. The examiner notes that Giese does not explicitly teach reciprocation. However, one of ordinary skill in the art would recognize that such reciprocation would be necessary between uses of the pump of Giese in its application as a mud gun.

22. Regarding claim 3, Giese teaches a rotatable, but axially immovable threaded spindle nut (28) threadedly engaging an axially movable threaded spindle (29).

23. Regarding claim 4, Giese teaches that the threaded spindle is a threaded shaft (29) releasably (see nut in Fig. 2) connected at its actuating end to the piston (17).

24. Regarding claim 5, Giese teaches that the spindle nut (28) is releasably connected to the reduction gear (36).

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25. Regarding claim 47, Dietz et al. teaches a pump device for the hydraulic activation of a safety valve (60) on a tree used in the production of hydrocarbons, comprising, as taught by Yie, a body (40) with a cylinder (41) housing a piston (45) such that hydraulic fluid can be pumped under pressure in the cylinder in the direction of the safety valve (60, of Dietz et al.). Further, as taught by Giese, the pump device comprises an electrical device (32) movably connected to gears (28, 29, 35, 36) for rotating an axially immovable threaded spindle nut (28) threadingly engaging an axially movable threaded spindle (29) connected to the piston of the piston-cylinder unit to move the piston in a longitudinal direction inside the cylinder as the threaded spindle nut (28) threads onto the threaded spindle (29).

26. Claims 6 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. in view of Yie Giese as applied to their respective parent claims above, and further in view of Flinchbaugh et al. (US 4,398,110).

27. Regarding claim 6, neither Dietz et al., Yie, nor Giese teach a harmonic drive gear. As a result, neither teaches a flexible cup-shaped toothed sleeve. Flinchbaugh et al. teach an electric actuator including a harmonic gear (see abstract), and indicate generally that harmonic gears provide a high torque to weight ratio (col. 1, ln. 51-55). Speaking generally, harmonic drive gears are well known in the art, and are known to provide an excellent gear ratio in a compact (and thus light as indicated by Flinchbaugh et al.) package. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the gear train of the pump of Giese to include a

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harmonic drive gear as taught by Flinchbaugh et al., in order to take advantage of the harmonic drive gear's characteristic compactness and lightness. As taught by Flinchbaugh et al., such a harmonic drive gear would include a flexible, cup-shaped toothed sleeve (32) which would be rotationally rigidly connected to the spindle nut (47) of Giese.

28. Regarding claim 39, in a combination of Dietz et al, Yie, Giese, and Flinchbaugh et al., the reduction gear is a harmonic drive gear as taught particularly by Flinchbaugh et al.

29. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. in view of Yie, Giese and Flinchbaugh et al. as applied to claim 6 above, and further in view of Campbell et al. (US 3,261,591).

30. Regarding both claims 8 and 9, in the combination, a wave generator (62) as taught by Flinchbaugh et al. would be rotationally rigidly connected to a first spur wheel (49) of Giese, and a second spur wheel (44) would be rotationally rigidly connected to the drive shaft of the motor (50) of Giese. Neither Giese nor Flinchbaugh et al. teach that the spur gear is helically toothed. However, Campbell et al. teach a gear system for a winch, and teach "helical or double helical gear trains interposed between the prime mover and the haulage element dependent on the torque and speed of rotation," (col. 1, ln. 30-32). As a result, it is clear that one of ordinary skill would be aware of the presence of helical and double helical spur gears in the art, and that they would be provide the predictable result of transferring rotation between the drive shaft of Giese to

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the piston. Further, Giese, Flinchbaugh, and Campbell all provide evidence that the provision of various gears may be accomplished by methods known in the art.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a helical or double helical spur gear in the drive train of the pump of Giese as modified by Flinchbaugh et al. and used in the system of Dietz et al., as such a gear would constitute a mere substitution of one known element for another to achieve a predictable result.

31. Claims 36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietz et al. in view of Yie as applied to claim 1 above, and also in view of Giese as applied to claim 3 above respectively, and further in view of Hommel (US 6,208,923).

32. Regarding claim 36, neither Dietz et al., Yie nor Giese teach redundant servomotors. Hommel teaches a fault-tolerant steering mechanism, including a reciprocating element (1) analogous to the piston of Giese, and two servomotors (14a, 14b) arranged to actuate the reciprocating element (1) and arranged in a redundant fashion. Hommel teaches that this provides reliable control of the reciprocation, even in the event of a fault (col. 1, ln. 40-42). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use two redundantly arranged servomotors as taught by Hommel to replace the electric motor of Giese, in order to gain reliability of control.

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33. Regarding claim 38, Hommel teaches a position sensor (3) detects the position of the reciprocating element, which would be the threaded spindle in the present combination.

Response to Arguments

34. Applicant's arguments, see page 10, filed 12 February 2009, with respect to the drawings and indefiniteness have been fully considered and are persuasive. The objection to the drawings and rejection of claims under 35 U.S.C. 112 has been withdrawn.

35. Applicant's remaining arguments have been fully considered but they are not persuasive.

36. As an initial matter, the examiner notes, as the applicant appears to be aware, that the so-called "teaching, suggestion, motivation" is no longer the single standard for determining obviousness.

37. With respect to the argument that Giese does not teach normal pumping operations such as fluid drawn in and expelled by reciprocation, the examiner submits that this argument is moot in light of the new grounds of rejection over Dietz et al. and Yie.

38. With respect to the argument that Dietz et al. does not teach injection fluid, the examiner submits that there is neither a definition of "injection fluid" within the applicant's specification in a form which affects the claims nor accepted in the art. As such, the examiner considers the injection of hydraulic fluid into the safety valve system of Dietz et al. sufficient to qualify that fluid as "injection fluid."

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39. The examiner notes that Flinchbaugh teaches in its abstract a "deep cup harmonic drive gear train member" which is shown in the drawings of that reference. This harmonic drive gear is taught as having two sets of teeth (74 and 78) which mesh at two points to form a reduction gear (col. 3, ln. 35-46). The examiner also notes that, contrary to applicant's assertion, a reason for utilizing this gear structure has been provided in the rejection, particularly to obtain the characteristic benefits of compactness and lightness.

40. With respect to the argument that helical and double helical gears are obvious, the examiner submits, as detailed above, that helical and double helical spur gears are well known in the art as evidenced by Giese and Campbell, and that their use in the combination set forth above constitutes the mere substitution of one known element for another by known methods to achieve predictable results.

41. With respect to the argument that there is no reason to combine Dietz et al. and Yie, the examiner disagrees. Dietz et al. plainly contemplates a conventional pump (102). Combining the teachings of Yie merely represents the fleshing out of the apparatus of Dietz et al. with information plainly available to those of ordinary skill in the art.

42. With respect to the argument that no reason to modify Dietz et al. in view of Hommel, the examiner disagrees. In particular, as stated above, the modification provides the modified apparatus with a more reliable control scheme as taught by Hommel. Further, the examiner notes that the position sensor of Hommel is provided to a reciprocating member, and submits that it would be obvious, in a combination, to

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provide the position sensor to the reciprocating member of the modified apparatus of Dietz et al., i.e. the threaded spindle of Giese. Finally, the applicant states that none of the references teach an electric motor and two servomotors providing redundancy to the electric motor, however this limitation is not present in the claims.

43. The applicant's remaining arguments are viewed as being moot in view of new grounds of rejection above.

Conclusion

44. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Stimpert whose telephone number is (571)270-1890. The examiner can normally be reached on Mon-Fri 7:30AM-4:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
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8 May 2009